APOA1 gene

apolipoprotein A1

Normal Function

The *APOA1* gene provides instructions for making a protein called apolipoprotein A-I (apoA-I). ApoA-I is a component of high-density lipoprotein (HDL). HDL is a molecule that transports cholesterol and certain fats called phospholipids through the bloodstream from the body's tissues to the liver. Once in the liver, cholesterol and phospholipids are redistributed to other tissues or removed from the body.

ApoA-I attaches to cell membranes and promotes the movement of cholesterol and phospholipids from inside the cell to the outer surface. Once outside the cell, these substances combine with apoA-I to form HDL. ApoA-I also triggers a reaction called cholesterol esterification that converts cholesterol to a form that can be fully integrated into HDL and transported through the bloodstream.

HDL is often referred to as "good cholesterol" because high levels of this substance reduce the chances of developing heart and blood vessel (cardiovascular) disease. The process of removing excess cholesterol from cells is extremely important for balancing cholesterol levels and maintaining cardiovascular health.

Health Conditions Related to Genetic Changes

familial HDL deficiency

Mutations in the *APOA1* gene cause familial HDL deficiency, an inherited condition characterized by low levels of HDL in the blood and an elevated risk for early-onset cardiovascular disease, which often occurs before age 50. These mutations lead to an altered apoA-I protein. Some versions of the altered protein are less able to promote the removal of cholesterol and phospholipids from cells, which decreases the amount of these substances available to form HDL. Other versions of the altered protein are less able to stimulate cholesterol esterification, which means cholesterol cannot be integrated into HDL particles. Both types of mutation result in low HDL levels. A shortage (deficiency) of HDL is believed to increase the risk of cardiovascular disease.

other disorders

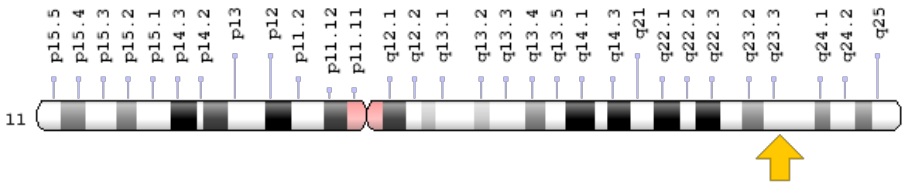
Mutations in the *APOA1* gene can also cause a condition called familial visceral amyloidosis, which is characterized by an abnormal accumulation of proteins (amyloidosis) in internal organs (viscera). The mutations that cause this condition alter the apoA-I protein. Abnormal apoA-I proteins stick together to form amyloid

deposits that impair the function of the affected organs. The liver, kidneys, and heart are commonly affected by amyloidosis. Depending on the organs involved, the signs and symptoms of the condition vary. Affected individuals can have an enlarged liver (hepatomegaly), chronic kidney disease, or a form of heart disease called cardiomyopathy. However, in some people, the condition is very mild and causes no apparent signs or symptoms.

Chromosomal Location

Cytogenetic Location: 11q23.3, which is the long (q) arm of chromosome 11 at position 23.3

Molecular Location: base pairs 116,835,751 to 116,837,950 on chromosome 11 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- apo-AI
- apoA-I
- APOA1_HUMAN
- apolipoprotein A-I

Additional Information & Resources

Educational Resources

- Biochemistry (fifth edition, 2002): The Complex Regulation of Cholesterol Biosynthesis Takes Place at Several Levels
  https://www.ncbi.nlm.nih.gov/books/NBK22336/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28APOA1%5BTI%5D%29+OR+%28apolipoprotein+A-I%5BTI%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+360+days%22%5Bdp%5D

OMIM

- AMYLOIDOSIS, FAMILIAL VISCERAL
  http://omim.org/entry/105200
- APOLIPOPROTEIN A-I
  http://omim.org/entry/107680

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_APOA1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=APOA1%5Bgene%5D
- HGNC Gene Family: Apolipoproteins
  http://www.genenames.org/cgi-bin/genefamilies/set/405
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=600
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/335
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